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ABSTRACT

Environmental educators often maintain that elementary education should work to improve and protect the environment by producing environmentally informed, committed, and active citizens. However, research shows that implementation of environmental education in elementary schools is problematic and not very successful. This paper identifies a perceived gap with the field of environmental education research and literature. It focuses on the characteristic knowledge of Australian elementary school teachers about environmental education. A combined-methods approach utilizing both qualitative and quantitative methods was applied to investigate teachers' knowledge. Study findings indicate that Queensland elementary school teachers have varying levels of commitment to and little knowledge of environmental education concepts, theories, and teaching approaches. These teachers tend to dismiss the importance of knowledge, preferring to focus on attitudes and values in the teaching of environmental education. Such levels of environmental literacy are inadequate to ensure the development of environmentally literate students who become environmentally literate citizens. (Contains 108 references.) (SM)

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The Value of Teachers' Knowledge:
Environmental Education as a Case Study

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Abstract

Environmental educators often maintain that primary school education should endeavour to improve and protect the environment through producing an 'environmentally informed, committed and active citizenry', yet existing research shows that the implementation of environmental education in primary schools is problematic and has had limited success. The reasons for these shortcomings are far from clear, with present research merely speculating about barriers to effective implementation.

To this extent, this paper identifies a perceived gap within the field of environmental education research and literature. This field has neglected studies of primary school teachers' knowledge about environmental education as a factor affecting the capacity of schooling to achieve environmental education goals. Thus, environmental education research is limited and potentially invalidated by the scarcity of empirical research associated with primary school teachers' knowledge about environmental education.

This paper is about the characteristic knowledge of Australian primary school teachers about environmental education. A combined-methods approach utilising both qualitative and quantitative methods was applied to investigate teachers' knowledge. I utilise the concept of 'environmental literacy' to assess primary school teachers' knowledge about environmental education.

Based upon the findings of this study, I contend that current Queensland primary school teachers have varying levels of commitment to and demonstrably lack knowledge of environmental education concepts, theories and teaching approaches. More significantly, these primary school teachers tend to dismiss the importance of knowledge, preferring to focus upon attitudes and values in the teaching of environmental education. As shown in existing research, such trends can be placed in wider theoretical debates to do with knowledge and education generally. In any case, such levels of environmental literacy are inadequate if environmentally literate students and thus an environmentally literate citizenry are to be achieved within schools.

Revealing the 'Rifts'

> *Our reflective intellects inhabit a global field of information, pondering the latest scenario for the origin of the universe as we absently fork food into our mouths, composing presentations for the next board meeting while we sip our coffee or cappuccino, clicking on the computer and slipping into cyberspace in order to network with other bodiless minds, exchanging information about gene sequences and military coups, "conferencing" to solve global environmental problems while oblivious to the moon rising above the rooftops.*

Our nervous system synapsed to the terminal, we do not notice that the chorus of the frogs by the nearby stream has dwindled, this year, to a solitary voice, and that the song sparrows no longer return to the trees .... (Abram, 1996, pg.265-266).

In 1992 the Union of Concerned Scientists, representing more than sixteen hundred senior members of the scientific community, including 102 Nobel Prize recipients, warned that "human beings and the natural world are on a collision course ..." and that "... a great change in our stewardship of the earth and the life on it is required, if vast human misery is to be avoided and our global home on this planet is not to be irretrievably mutilated" (cited in Suzuki, 1993, pg.4).

Complementing the body of scientific research identifying environmental changes (Agarwal, 1992; Baarschers, 1996; Bailey, 2000; Carson, 1965; Ehrlich, 1971, 1991; Starke, 1998; Washington, 1991; Wright, 1993), there is a growing body of literature that identifies the present pattern of technological, economic, environmental and social developments by human beings as the primary cause of what some identify as an 'environmental crisis' (see Carson, 1965; Durning, 1992; Ehrlich, 1986; Evernden, 1989; Gore, 1992; Hillcoat, 1999; Milbraith, 1989; Orr, 1992; Schumacher, 1973; Suzuki, 1999; Weston, 1994, 1999)[1].

Fien reported in 1995 (pg.1) that "public concern for the environment is at unprecedented levels throughout the world". However, in recent times such concern has declined with OECD (2001, pg.1) findings identifying that concern for the environment has decreased on an international level. Such data are consistent with the Australian Bureau of Statistics findings that in 2001: "concern about environmental problems among Australian households dropped to its lowest level since recording by the Australian Bureau of Statistics (ABS) started, with 62% of Australian households reporting being concerned over the environment in 2001 compared with 75% in 1992... Increasingly, more people stated 'no time' as the main reason for not being involved..." (Australian Bureau of Statistics, 2001, pg.1).

Whatever the debates, and despite conflicting views about the existence of a crisis and the varying degrees of concern for the environment, the concept of sustainable development has remained as the dominant policy goal for future development in many developed and developing countries (UNESCO-UNEP, 1992). However, sustainable development is a fluid concept, encompassing a range of technological perspectives as well as a range of ecological perspectives. Technological perspectives of sustainable development promote the view that advances in technology and the operation of free market economic forces will be sufficient to remedy the effects of an environmental crisis. In contrast, ecological perspectives of sustainable development promote radical world-views towards more fundamental, transformative cultural changes (O'Riordan, 1981). This theoretical divide has given rise

[1] It must be noted that the existence of an environmental crisis is not universally accepted, with commentators such as Kahn et al. (1976), Manes (1990), Ray et al. (1992) and Lomborg (2001) contending that the predictions of catastrophe arising out of research identifying changes to various environmental indicators are ill-conceived and overly pessimistic.

to much conflict between and among academics, environmental groups, governments and educators with regards to determining the preferred sustainable development model for future development.

Coupled with the endorsement of sustainable development, at least since the United Nations Conference on the Human Environment held in Stockholm in 1972, there has been strong support "for the development of environmental education as one of the most critical elements of an all-out attack on the world's environmental crisis" (UNESCO-UNEP, 1976, pg.2). This same support is reiterated in the more recent discussion paper authored by Environment Australia (1999, pg.13) which asserts: "It is widely agreed that education is the most effective means that society possesses for confronting the challenges of the future. Indeed, environmental education will shape the world for tomorrow". The foundation of this support, particularly during the 1990s, primarily laid with the search for sustainable methods of development and living (World Commission On the Environment Development, 1990)[2].

The focus upon environmental education has resulted in efforts being made over the past three decades to incorporate environmental education into international, national and state education policy and curriculum documents. In the case of Australia, efforts have been made to incorporate environmental education into state curriculum and policy documents, although education departments have been slow to uptake environmental education and, consequently, implement it into schools systems. Quite critical for this paper, in Queensland schools, environmental education is predominantly incorporated into the curriculum through the recently developed 'Studies of Society and Environment' syllabus (Queensland School Curriculum Council, 2000a).

As might be expected, there are a variety of disparate views about the proper role of environmental education (see Clacherty, 1993; Fien, 1992, 2000; Gough, 1997; Jickling, 1998; Orr, 1992; Rossen, 1995; Walker, 1997). In this vein, a number of approaches have been developed and are the subject of many debates in the environmental education field. These approaches include: education *about* the environment, education *in* (or *through*) the environment and education *for* the environment. More specifically:

> Learning how to care for our environment involves understanding concepts **about** the environment, developing sensitivities **through (in)** the environment and fostering values that commit us to acting **for** the environment. This last aspect is perhaps the most important; knowledge about and experience of the environment have limited value unless they are accompanied by a desire to actively care for the Earth, other people and ourselves (Queensland Department of Education, 1993, pg.5).

For the past two decades education *for* the environment has been identified, by authorities in the environmental education field, as the preferred approach (Fien, 1988, 1992, 1993a, 2000, 1996, 1993b;

[2] The 'actual' levels of support, which extend beyond policy statements, for environmental education in Australia and abroad is yet to be fully explored.

Huckle, 1991; Queensland Department of Education, 1993). Fien (1992; 1993) situates environmental education in various philosophical, political and environmental visions, such that he categorises education *for* the environment in a socially critical framework embedded in a communalist, ecosocialist (red-green) environmental ideology. Fien (1992) claims that education *about* the environment and education *in* the environment should play a subsidiary role providing the necessary skills and knowledge to support education *for* environment. To this extent, it is often argued "that it is only when the overall intention is education *for* the environment that real environmental education is actually taking place" (Board of Teacher Registration, 1993). In recent times, this contention has been the centre of much debate.

Jickling and Spork (1998), in a critique of education *for* the environment, argued that education *for* the environment indoctrinates students into one specific way of knowing and believing, namely the red-green ecosocialist position. Jickling and Spork (1998, pg.319) maintained the argument put forth in an earlier paper by Jickling (1991, pg.154-155) stating that students should participate "as intelligent individuals in the constant re-examination and re-casting of society".

Jickling and Spork (1998, pg.317) further argue that the combination of a socially critical approach and a communalist environmental ideology blurs "personal commitment with the role of education". In other words, they raise the question is a "red-green ecosocialist position" appropriate to the "aim of or heart of or central to education"? (Jickling, 1998, pg.317). Jickling and Spork (1998) contend that education *for* the environment, defined in this sense, "begins to look like education *for* a red-green future", which in their minds blatantly ignores the breadth and the emergence of environmental philosophy and makes the false proposition that knowledge about this notion of a 'red-green future' is real and readily available. To this end, they conclude that education *for* the environment "is conceptually and linguistically flawed and that we may not need, or want, the structures that it imposes" (Jickling, 1998, pg.309). The works of Walker (1997) and Cutter and Smith (2001a; 2001b) reiterate the latter view. Walker (1997, pg.155) concluded "if environmental education is to become important in school education a more adequate theory is required".

Furthermore, in the debates, there is little evidence of the regular and successful uptake of 'education *for* the environment', nor any other forms of environmental education, in primary school systems. I interpret such findings to mean that little is known about the effectiveness of dominant and subsidiary environmental education approaches in the teaching and learning of environmental education. Thus, it can be seen that a study of environmental education practice is timely and essential if the field is to evolve with respect to bringing clarity and direction to environmental education. This paper is a contribution to the endeavours outlined by such research and I now review the various debates.

"The world's teachers"... are said to "have a crucial role to play" in bringing about the extensive social changes needed to address an environmental crisis (World Commission On the Environment Development, 1987, pg.xiv), yet little is known about the extent to which environmental education has been incorporated into primary school systems. In Australia, in particular, there have been few studies examining environmental education teaching practice in primary school systems[3]. Despite the varying levels of support for environmental education, the evaluation studies that have been conducted indicate that policy expectations are rarely met (see Cutter, 1998, 2001a, 2001b; Gough, 1997; Greenall, 1981; Linke, 1980; Murdoch, 1989; Phipps, 1991; Spork, 1990, 1992; Walker, 1995)[4].

In 1973 and 1974 Linke (1980) conducted a national study in Australia, utilising both quantitative and qualitative methodologies, concerning the uptake of environmental education content and pedagogy in all levels (primary, secondary and tertiary) of education. Linke's (1980) study indicated that environmental education teaching practice was limited in Australia and most often taught through curriculum domains such as science and social studies. The implications, for environmental education, of this shift to other disciplines is yet to be fully explored.

Like Linke (1980), Robottom et al. (2000) also found in a case study of five schools, that environmental education is most often incorporated into subjects such 'Studies in Society and Environment'. They also reported that, in some cases, "environmental education curriculum has moved out of the school and into the community" (Robottom, 2000, pg.146). In short, Robottom et al. (2000, pg.157) concluded that "behind every successful environmental education program is a committed teacher". Such findings are also reiterated in the works of Cutter and Smith (2001a; 2001b).

Stapp and Stapp (1983) also conducted a qualitative study which listed over one hundred issues and recommendations for the improvement of environmental education in Australia. However, this study was limited in that neither primary or secondary school teachers' knowledge, attitudes and/or practices of environmental education were thoroughly investigated.

Other than the Linke 1973/4 (1980), Robottom et al. (2000) and Stapp and Stapp (1983) studies, only small-scale regional (see Clark, 1997; Cutter, 1998, 2001b; Phipps, 1991; Skamp, 1996; Spork, 1990,

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[3] It is important to verify that there is no more known about the teaching of environmental education in primary schools than secondary or tertiary education. However, this paper only focuses upon primary level environmental education.

[4] There are many studies which have also been undertaken outside of Australia (Buethe, 1987; Ham, 1987; Rickinson, 2001; Tilbury, 1992; Todt, 1995; Wisconsin Center for Environmental Education, 1997). Some of these studies are referred to in this section, however as this paper particularly focuses upon environmental education in Australia, particularly Queensland, such works are only included where explicitly relevant.

1992; Walker, 1995) and state (see Education Department of Victoria, 1981; Greenall, 1981) investigations have been carried out.

All of these studies (see Cutter, 1998, 2001b; Education Department of Victoria, 1981; Greenall, 1981; Phipps, 1991; Spork, 1990, 1992; Walker, 1995), save Skamp (1996) and Clark and Harrison (1997), claim that environmental education practice, with regards to its uptake in primary schools, is inadequate in that it does not achieve the outcomes communicated in policy documents. In contrast, Skamp's (1996) and Clark and Harrison's (1997) New South Wales regional studies suggest that teachers are practising environmental education action components. Clark and Harrison (1997, pg.34) hypothesise that "many Australian primary schools are addressing environmental education, although they might not call it that".

Nonetheless, Spork (1990; 1992) claims that primary school teachers consider environmental education to be an important learning area, but seem to lack the skills and knowledge to successfully teach environmental education. Similar statements have also been echoed in the works of Cutter (1998), Cutter and Smith (2001b), Murdoch (1989), Phipps (1991) and Walker (1995).

No Australian studies to date, other than the recent works of Cutter and Smith (2001b), have actually investigated primary school teachers 'content' knowledge of environmental concepts and issues. Cutter and Smith (2001b) identified that primary school teachers tend to maintain low levels of content knowledge of environmental concepts and do not consider content knowledge to be overly important. An international study undertaken by Todt (1995) made similar findings. In particular, Todt (1995) identified in a study of South-Central Ohio teachers that teachers maintain low levels of environmental knowledge, in addition to many misconceptions about the environment. This issue of content knowledge is taken up further in the theoretical framework section and data presentation, analysis and synthesis section of this paper.

To date, Spork's (1990) study remains to be the only Queensland study[5], since Linke's (1980) national study, of primary school teachers' uptake of environmental education content and pedagogy. Therefore, her study is particularly significant, and I now briefly recount the conclusions of Spork's (1990) investigation.

The 'Queensland' Case

Spork (1990; 1992) randomly selected and surveyed 300 state primary school teachers from the Brisbane north region and achieved a seventy-six percent (228 teachers) response rate. The purpose of her study was to determine the level of environmental education practice particularly in relation to education *about* the environment, education *in* the environment and education *for* the environment.

[5] Of course this excludes the recent works of Cutter and Smith (2001a; 2001b).

She found that the practice of education *for* the environment among the primary school teachers in question was relatively low even though the research and literature argues that education *for* the environment is central to environmental education. Similarly, it was noted, in relation to teachers' beliefs about the different levels of importance of education *in, about* and *for* the environment, that the sampled teachers considered education *in* and *about* the environment to be of more importance than education *for* the environment. However, the sampled teachers conveyed positive attitudes towards environmental education as a whole.

This sample had received relatively little professional preparation to teach environmental education. Only 4.9% of these teachers received pre-service environmental education training and only 6.6% received in-service training.

Among the reasons offered for low levels of environmental education practice were a perceived lack of teacher training in environmental education and time and resource constraints for teachers (Spork, 1990, 1992). As a consequence of this study and the other studies (see Fien, 1996; Tilbury, 1992; UNESCO-UNEP, 1990) indicated earlier, environmental education research has tended to conclude that the problems associated with the implementation of environmental education are due to a lack of adequate pre-service and in-service environmental education training. Thus, the provision of further or restructured teacher education has been identified as the 'priority of priorities' for environmental education (see Ballantyne, 1995; Fien, 1996; Tilbury, 1992; UNESCO-UNEP, 1990)

However, such propositions tend to be based on both a lack of empirical evidence and a theoretical presumption that the 'content' of environmental education is unproblematic. Spork's (1990, pg.101) study has contributed to this phenomenon through her recommendation that more teacher-education was warranted because teachers possess inadequate "knowledge of how to do environmental education or what environmental education is". However, her study was not a dedicated study of teachers' environmental education knowledge. Her questionnaire only questioned teachers about general concepts in the three different approaches, particularly education *for* the environment. Environmental education consists of many concepts and varied forms of pedagogy which Spork (1990) did not include in her research design. Further, Spork (1990) did not pay heed to the contested nature of 'education *for* the environment', nor environmental education generally. Thus, it appears that her conclusions about primary school teachers and what they might or might not know about environmental education were indicative but require further and deeper investigation.

In this respect, Walker (1997, pg.160) also recognised the problematic nature of education *for* the environment and environmental education and concluded that poor environmental education practice can be directly related to "a difference, or 'gap' between theories held by policy makers, curriculum developers and educational researchers and the theories held by practitioners". I interpret this research to mean that there are many inconsistencies about what the various individuals and groups consider

environmental education to be. Therefore, a better understanding of these inconsistencies appears to be necessary so as to lead to a more inclusive and defined form of environmental education.

In these ways, there are theoretical and empirical 'gaps' in environmental education research that require further investigation. Before outlining the methodological approach, I now turn to the theoretical framework of this paper. I briefly begin with a discussion about the concept of knowledge.

Theoretical Framework

'Knowledge'

Palonsky (1993, pg.7) maintains that the profession of teaching assumes "that good teachers possess a special knowledge base – "a codified or codifiable aggregation of knowledge, skill, understanding, and technology, of ethics and disposition, of collective responsibility" – as well as a means for representing and communicating it". Shulman's (1987) earlier work brings focus to this view. Shulman (1987, pg.8) identifies seven categories of teacher knowledge. These include content knowledge; general pedagogical knowledge; curriculum knowledge; pedagogical content knowledge; knowledge of the learners and their characteristics; knowledge of educational contexts; and knowledge of educational ends, purposes, and values and their philosophical and historical grounds.

Shulman (1987, pg.8) maintains that 'pedagogical content knowledge' lies at the heart of teaching because it represents the ways in which teachers "blend academic content with teaching methods, organize instruction, and unite all these elements with the interests and abilities of the students in their class". Shulman (1987) claims that "teachers' knowledge of the content affects both what teachers teach and how they teach it" (cited in Grossman, 1995, pg.21). In this way, "teachers are likely to emphasize those areas in which they are more knowledgeable and to avoid or de-emphasize the areas in which they have relatively less content knowledge" (cited in Grossman, 1995, pg.21). To this extent, it could be contended, based upon the arguments presented in the previous section, that primary school teachers may avoid or de-emphasise environmental education if they have relatively less content knowledge about environmental education. Such propositions can be situated in the wider debates surrounding teacher knowledge preparation.

For example, Good (1990), Reynolds (1989) and McMeniman et al. (2000) claim that teacher education is now able to equip pre-service and in-service teachers with 'state-of-the-art' instructional knowledge. It must be noted that such authors fail to mention 'what' is 'state-of-the-art' instructional knowledge and how this is utilised to equip student teachers and practicing teachers. My point relates to a previous argument of Shulman's (1986a) which states "major elements of teacher knowledge have not yet been uncovered or sufficiently defined" (cited in Palonsky, 1993, pg.8).

Furthermore, Holbrook et al. (2000) maintain that educational research has had little impact upon Australian teachers and their teaching practices. Holbrook et al. (2000, pg.6) discovered that

"university research in schools was largely indirect, unstructured and often mediated through individuals". Thus, it appears that 'the state-of-the-art' instructional knowledge Good (1990), Reynolds (1989) and McMeniman et al. (2000) referred to is yet to be fully defined and developed so as to 'impact Australian teachers and their teaching practices'.

It is this form of instructional knowledge which Shulman (1986b) refers to as 'pedagogical content knowledge'. Almost two decades ago Shulman (1986b, pg.6) argued that teachers' 'pedagogical content knowledge' is the "missing paradigm" in the discussions surrounding the issue of knowledge. Grossman, Wilson and Shulman (1989) outline four types of 'pedagogical content knowledge', namely content knowledge, substantive knowledge, syntactic knowledge, and beliefs about the subject matter:

1) *content* is the substance of the discipline, the facts, principles, concepts (Grossman, 1989, pg.27)[6];
2) *substantive knowledge* is associated with the structures of the discipline and the paradigms in which such structures are located so as to guide inquiry (Grossman, 1989, pg.29);
3) *syntactic knowledge* is created in the discipline, about the canons of evidence (Grossman, 1989, pg.29);
4) *beliefs* influence what teachers select to teach and in turn how such subject matter is interpreted. Grossman, Wilson and Shulman (1989) point out that beliefs have not been thoroughly researched and are less understood than the other identified areas of knowledge (cited in Whelan, 1992, pg.82).

This 'pedagogical content knowledge' framework is grounded in the academic rationalist tradition which assumes that the teacher is an expert of the discipline/s and is able to disseminate this knowledge to students in a capturing and exciting manner. Whelan (1992) argues that Shulman's academic rationalist model of 'pedagogical content knowledge' is rarely implemented nor achieved in classrooms. Whelan (1992, pg.83) further explains: "it is acknowledged... even among its supporters (Shulman, 1987)... that there is inadequate support for the claim that this model is achieved often".

Furthermore, Wilson (1998) maintains that 'knowledge' as a focus in education has been more or less abandoned for over thirty years now. In Wilson's (1998, pg.3) view, 'knowledge' lost its salience for teachers and education systems during the 1960's and 70's. More specifically, Wilson (1998, pg.3) argues that the education profession "came to believe that education was no longer about filling up people's minds with a lot of stuff". Wilson (1998) further asserts that the latter model, of "filling up people's minds with a lot of stuff", is now considered to be a 'bad' model of education. Wilson's (1998, pg.3) key argument is that this dramatic shift in thinking was entirely about knowledge:

> That was what filled the bucket wielded by teachers. That was what the author had, and has to be disposed of. That was what God was the source of. And it would have been what professors possessed if they has been in their offices. Knowledge.

[6] Schwab (1964) referred to this particular type of 'content' knowledge as 'substantive knowledge'.

He claims that "... while we weren't watching, knowledge became a bad thing. It was erased from educational offer, or at least reduced substantially in importance" (Wilson, 1998, pg.3). In this way, the knowledge which Wilson (1998) is explicitly referring to is content knowledge. Wilson's (1998, pg.5) explanation of this shift is that educators who anticipated the post-modern age were antagonistic to knowledge and reason, especially empirical knowledge and scientific rationality. Such eductors sought self-realisation in personal experience, creativity and imagination as a means for understanding the world, as a reaction to the perception that teaching in the 1960's was too *fact* oriented and susceptible to rapid changes in knowledge content.

The 'Queensland School Reform Longitudinal Study' further supports Wilson's (1998) contentions, with recent findings revealing that "teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest" (Education Queensland, 2001, pg.15). Furthermore, Education Queensland (2001, pg.9) reported that teachers "viewed behaviour management as a policy issue that required improvement prior to any considerations of classroom practices". Bernstein's (1996) analysis of the acquisition-competence model covers the same ground such that the internal workings of the learner rather than measurable learning outcomes dominate teaching and teacher education.

Notwithstanding, so as to situate such arguments in environmental education and specifically in the realm of primary school teachers' knowledge about environmental education, I now discuss the theoretical concept of 'environmental literacy'. The theoretical concept of environmental literacy is utilised for the interpretation, analysis and synthesis of data that appear later in this paper.

Environmental Literacy as Pedagogical Content Knowledge

In this section, I set out a model for gauging primary school teachers' knowledge about environmental education, including environmental concepts and issues. I begin with the concept of knowledge and propose that to teach environmental education, teachers require a relevant stock of knowledge. To do this, I draw on Orr's (1992) concept of 'environmental literacy'.

This is an appropriate concept for use in this paper for three reasons. First, it emphasises the 'content knowledge' referred to earlier as teachers' pedagogical content knowledge. Second, environmental literacy evokes those ideas and approaches that environmentalists consider fundamental in environmental education. Third, the concept provides a yardstick or set of criteria against which I gauge teachers' environmental literacy in the empirical work reported in this paper.

UNESCO-UNEP (1989) states that environmental literacy is an ultimate goal of environmental education. In syllabus and curriculum terminology, this means that environmental literacy has content, skills and processes that learners ought to know and be able to do, to demonstrate 'literacy'. According

to Orr (1992, pg.92), environmental literacy is the "knowledge necessary to comprehend relatedness, and an attitude of care or stewardship. [An environmentally literate] person would also have the practical competence required to act on the basis of knowledge and feeling". Orr (1992) and Sturdavant (1993) consider environmental literacy, also known as ecological literacy, to be environmental education.

Roth coined the term environmental literacy in 1968. Harvey (1976, pg.67) defined an environmentally literate person as "one who possesses basic skills, understandings, and feelings for the man-environment (sic) relationship". Buethe and Smallwood (1987) defined it as one's understanding of environmental facts. As these definitions are fairly limited, environmental literacy was later redefined by a series of authors (see Hurry, 1982; Roth, 1992; UNESCO-UNEP, 1989).

Roth (1992, cited in Todt, 1995, pg.17) categorised individuals' environmental literacy into four levels, namely nominal environmental literacy, functional environmental literacy, structural / operational environmental literacy and multidimensional environmental literacy. Although Roth's (1992) categorisations are useful, Clacherty (1993, pg.114) alleges that such categorisations are inadequate for what is required to address the "dominant technocentric worldview which most of us, unwittingly, support". As highlighted earlier, environmental education approaches such as education *for* the environment have been criticised in a similar vein (see Jickling, 1992, 1994, 1998). For that reason, the term 'environmental literacy' has been reconceptualised to include a transformatory reconstruction of industrial culture.

It is this reconceptualisation which has seen the phrase 'environmental literacy' transform to become Orr's (1992) refined term 'ecological literacy'. Orr (1992) does not identify any differences between environmental literacy and ecological literacy. In addition, he uses them as interchangeable concepts, although others see them as having different meanings (see Quammen, 1994). This ambiguity in Orr's work is problematic. For the purposes of this paper, I continue to utilise the term 'environmental literacy'.

According to Orr (1992), environmental literacy primarily constitutes '*knowing, caring* and *practical competence*'. Orr (1992, pg.92) further implies that environmental literacy encompasses an understanding of "how people and societies relate to each other and to natural systems, and how they might do so sustainability". In other words, knowing how the world works, and therein knowing how to preserve and maintain the environment. To this end, Orr (1992) argues that the environmentally literate person understands the dynamics of the environmental crisis which includes a thorough understanding of how people (and societies) have become so destructive.

Orr (1990; 1992; 1994) argues that education is the most powerful mechanism to address the world's environmental challenges. He propounds that no student should graduate from any educational facility without knowing seventeen key subject areas. This is what he calls "a syllabus for environmental

literacy" (1992, pg.109). He lists, echoing Allan Bloom's approach, over one hundred articles and books as essential readings for all students and teachers. Orr (1992) draws works from distinguished philosophers such as Ehrlich, Bacon, Kahn, Berry, Merchant, Emerson, Lovelock, Eiseley, Leopold, Thoreau and so on.

It is this knowledge that Orr (1992) claims will enable educators, teachers and citizens to ask "what then?" Sturdavant (1993, pg.209) postulates that asking 'what then' requires:

> Interrogating the interconnected layers of practices, trends, and assumptions upon which we construct our present life style will render those interconnections and their ramifications more explicit, thereby making their sustainability available to assessment.

Orr (1992) and Sturdavant (1993) both argue that asking 'what then' will enable key stakeholders, such as educators, to construct a very different agenda for educational reform.

In order to begin the process of reform in education and environmental education, identifying primary school teachers' environmental literacy levels is a necessary step. Table 1.1 identifies various indicators which can be utilised to target teachers' environmental literacy levels. Of course, each literacy level is not mutually exclusive and teachers may be located within and between levels. As noted in the previous section, beliefs are inextricably part of pedagogical content knowledge, and therefore cannot be separated from teachers' knowledge in terms of measuring environmental literacy.

Table 1.1: Identifying Environmental Literacy Levels
(Adapted from the works of Fien, 1992; O'Riordan, 1981; Orr, 1990, 1992, 1994; Roth, 1992) (published in Cutter, 2001b, pg.51)

Environmental literacy	**Indicators**	
	Knowledge	*Beliefs*
Environmental Illiteracy	• Little understanding of environmental issues and/or the idea of an environmental crisis. • Many misconceptions about environmental issues.	• Believes that environment is a resource to be used by human beings. • Science and technology will solve/manage any problems. • All economic growth is good. • Suspicion that environmental education and social change are necessary.
Nominal Environmental Literacy	• Can recognise some basic terms used in communicating about the environment. • May possess misconceptions about and provide naïve explanations of environmental systems. • Is beginning to identify environmental problems and the issues surrounding proposed	• Is developing awareness and sensitivity towards the importance of natural systems and the human impacts on them. • Reformist belief that economic growth and resource exploitation can continue. • Provision of effective environmental management agencies at national and

	solutions.	local levels. • Raising environmental awareness and concern is necessary within society/education.
Functional / Operational Environmental Literacy	• Regularly uses environmental vocabulary with the correct definitions and in the appropriate context. • Understands the organisation and functioning of environmental systems and their interaction with human systems. • Possesses the knowledge and skills to act on local problems and be involved with environmental concerns at the education level.	• Is personally committed to environmental quality. • Belief in the intrinsic importance of nature for defining and sustaining humanity. • Rejection of materialism. • Lack of faith in large-scale technology and continued economic growth. • Personally committed to environmental education and the production of an environmentally literate and committed citizenry.
Highly Evolved Environmentally Literacy	• Possesses a thorough understanding of how people and societies relate to each other and to natural systems, and how they might do so sustainability. • Possesses a thorough understanding of the dynamics of the environmental crisis which includes a thorough understanding of how people (and societies) have become so destructive. • Possesses an understanding of models of sustainability and associated environmental perspectives. • Is able to synthesise environmental information and act upon that synthesis in ways that lead to environmental sustainability through environmental education.	• Faith in cooperative capabilities of societies to establish self-reliant communities base on sustainable resource use. • Belief in the intrinsic importance and preservation for defining nature and sustaining humanity. • A belief that humanity should live simply, so that others can live. • A passionate and committed belief in the production of an environmentally literate, committed and active citizenry.

Table 1.1 is based upon the works of O'Riordan (1981), Fien (1992), Roth (1992) and Orr (Orr, 1990, 1992, 1994). The beliefs column lists indicators to identify teachers' environmental perspective, whereas the knowledge column list indicators to identify teachers' environmental and/or environmental education knowledge. As such, I now turn to a brief discussion of the methods, techniques and modes of inquiry utilised to investigate primary school teachers' environmental literacy.

Methods, Techniques and Modes of Inquiry

A combined-methods approach is being applied to investigate primary school teachers' environmental literacy. The methodology consists of two stages which included a series of ethnographic interviews followed by the use of a quantitative mail survey.

An ethnographic approach was adopted in this study as the ethnographer ultimately seeks to document the 'knowledge and belief systems' of a given group. In this case, I as the ethnographer, seek to

document the 'knowledge and beliefs systems' of primary school teachers toward environmental education. According to Bernstein (1996, pg.137), in the classic ethnographic position "the researcher has first to learn the language of the group or society and know the rules of its contextual use". Moreover, Bernstein (1996, pg.138) explains:

> From here on, the researcher is developing reading rules (of recognition and realization) to grasp how members construct their various texts or mange their contexts. The researcher here is modeling the members' recognition and realization rules, or the strategies of practice those rules constrain... The problem is to construct the tacit model. If the researcher fails to construct the model s/he is marooned in the specific contexts and their enactments, is in no position to appreciate the potential of the meaning of that particular culture, and thus its possible enactments. Without a model, the researcher only knows what his/her informants have enacted.

As such, the previous section (Theoretical Framework) presents a tacit model which allowed me to 'grasp how members [teachers] construct their contexts [environmental education]'. Further, this model also enables me to develop the analytical codes (reading rules) for interpreting data. To this end, the application of ethnography, in conjunction with the theoretical model, provides a means for understanding what teachers' know and believe about environmental education. In order to determine the extent and distribution of the informants' meaning and understanding of environmental education among the wider population of primary school teachers, the application of a quantitative survey is being applied to confirm and elucidate the theoretical model and the views discovered using ethnography. I now briefly describe the methodological strategies utilised in stage one and stage two.

Stage One

In total twenty six primary school teachers were interviewed. Eighty-five percent of the participants were female and fifteen percent were male. The most current Education Queensland data reveals that seventy-eight percent of primary school teaching staff are female and twenty-two percent are male (Cheong, 2002). Thus, the ratio of females to males is reasonably consistent with Educational Queensland data. Further, the age range of the participants was from twenty-two to fifty-seven. The average age of the participants was thirty-nine and a half years of age. Once again, this is consistent with Education Queensland data which indicates that the average age of primary school teachers is forty years of age (Cheong, 2002).

Each of the twenty-six informants were interviewed once. The average duration of an interview was ninety minutes. The shortest interview was sixty minutes in length and the longest interview was one hundred and seventy minutes in length. There were no time restrictions placed on the interviews and all interviews progressed for as long as necessary.

Intensive ethnographic interviewing techniques were utilised in this study. Lofland and Lofland (1971, pg.76) describe intensive interviewing as "a guided conversation whose goal is to elicit from the interviewee (usually referred to as the informant) rich, detailed materials that can be used in qualitative analysis". According to Lofland and Lofland (Lofland, 1995) intensive interviewing serves as a tool to discover the perceptions and experiences the informant has had of a particular situation or topic. Whilst the chosen interview technique can be labeled intensive, it was also ethnographic in nature. In Potter's (1996, pg.96) view, the ethnographic interview "is not as balanced as most conversations are", rather the "ethnographer informs the interviewee of the purpose of the interview and then takes control by asking questions and probing the person's responses".

In accordance with Potter's (1996) advice and so that the informants' perspectives and experiences, or as Marshall describes "rich narrative descriptions" (Marshall, 1995, pg.82), were elicited and fully understood one-to-one interviewing was applied. Potter (1996, pg.97) recommends that the ethnographer "must cross-examine the subject so the researcher is sure he or she understands the subject's meaning". One-to-one interviewing allows for such cross-examination and profundity.

Unstructured ethnographic interview guides were prepared for the interviews. As Potter (1996, pg.97) suggests, the ethnographic interview guide is structured in relation to its direct, indirect and open-ended questions, but unstructured in that each interview was "responsive to the situation rather than standardized". Thus, the interview guide could be described as "a list of things to be sure to ask about when talking to the person being interviewed" (1995, pg.76). The content of the interview guide was derived from the issues raised in literature, which in turn formulated the impetus for the research problem and questions. The Theoretical Framework also directed a significant proportion of the content of the interview guide.

I utilised the computer software program NVIVO (QSR, November 2000) to store, categorise, code and analyse all stage one data. As Richards (2000, pg.59) notes, "qualitative researchers usually create categories in two different ways 'up' from the data, as meanings of the data are noted and stored, and 'down' from prior ideas, project designs and theories". I utilised both methods to categorise (code) the data. Such categories were refined into themes, and then into stories, which in turn formulate the substance of the qualitative data analysis presented in this paper.

Stage Two

So as to elucidate the findings discovered in the stage one phase of data collection, a quantitative survey is being administered in Queensland primary schools. To assist with the development of the survey, a pilot study was trailed. For purposes of this paper, only the pilot survey data will be utilised.

For the pilot survey, primary school teachers from various Queensland regions were sampled using convenience sampling methods. Five primary schools agreed to participate in the pilot survey. The

stage one informants also participated in the survey. The pilot survey acts to pretest the survey instrument and procedures for the study, in addition to testing data collection and analysis techniques (using SPSS) and identifying variance in the targeted sample population to do with age, gender, experience and training backgrounds.

Ninety primary school teachers were sampled in the pilot survey. Seventy-two completed questionnaires were received which equals an eighty percent response rate. Seventy-two percent of the sample were female and the remaining twenty-eight percent were male. The age range of participants was from twenty-two years of age through to sixty-one years of age. The average age of participants was forty-one years of age. Once again, such gender and age break-ups are consistent with current Education Queensland demographic data as discussed previously.

The pilot questionnaire was personally administered at the five participating school staff meetings, which ensured a high response rate. The stage one informants were mailed and emailed a questionnaire. The pilot questionnaire format and structure replicates the proposed mail survey. So as to increase the success of the survey, all elements of Dillman's (1978) total design method for mail surveys was utilised in the pilot study.

As this study was exploratory, each item was analysed individually. Nominal scales were applied for collating demographic data, such as gender, geographical location and year level, albeit age and teaching years which were collected using numerical scales.

As the survey consisted of only closed ended questions, only ordinal and ranking techniques were utilised, such as likert and multiple choice questions. Univariate analysis techniques, such as descriptive statistics, were applied to each individual question. The quantitative data collected was analysed using the statistical software package for the social sciences, SPSS (2000). I now present the stage one and stage two data.

Data Presentation

The data are presented is two sections, namely 'Teachers' Knowledge about Environmental Education' and 'Teachers' knowledge (and beliefs) about the environment, environmental concepts and content knowledge *per se'*.

Knowledge about Environmental Education

I sought to determine the stock of 'environmental education' knowledge among the participants. In this regard, the following comments are typical perceptions of environmental education offered by the participants in stage one[7]:

> In my classroom it means educating the children about the environment and their impact upon the environment (4).

> It is making sure that the people we are teaching understand what has to happen to keep where we live the way it should be and to improve it from what has been done to derogate it or to keep the status quo (20).

Such comments display simple understandings of environmental education according to Table 1.1 as illustrated earlier. However, another participant displayed a more complex understanding of environmental education through conveying a 'futures perspective' as can be seen in the following comment:

> That the future generations that we teach understand that the environment, local and global, has to be conserved so that it is there for future generations (12).

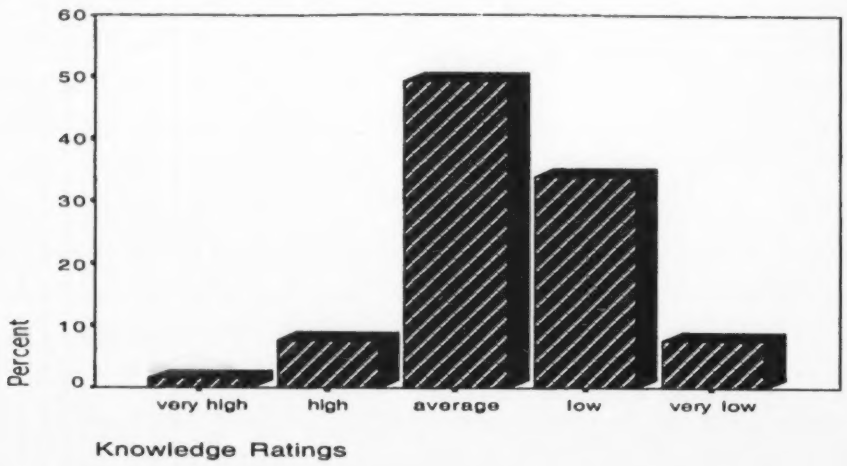
Even so, the majority of the participants expressed their lack of knowledge about environmental education. Approximately half of the participants responded with comments such as "I don't know a lot about it [environmental education]". More specifically, when asked "do you feel you know a lot about environmental education?" one participant said:

> No I don't. I think I know a little bit about it and I have an interest in it, so I can maybe start an interest in the children, and perhaps that will lead me to finding more information. I don't have a good awareness (4).

As illustrated in Figure 1.1, the pilot survey further confirmed this finding with *seventy-five percent* of the sample rating their knowledge of environmental education concepts, theories and teaching approaches as *average to low*.

[7] All comments indicate a number (code) which allows the author to check and identify data sources.

Figure 1.1: Ratings of Knowledge about 'Environmental Education'

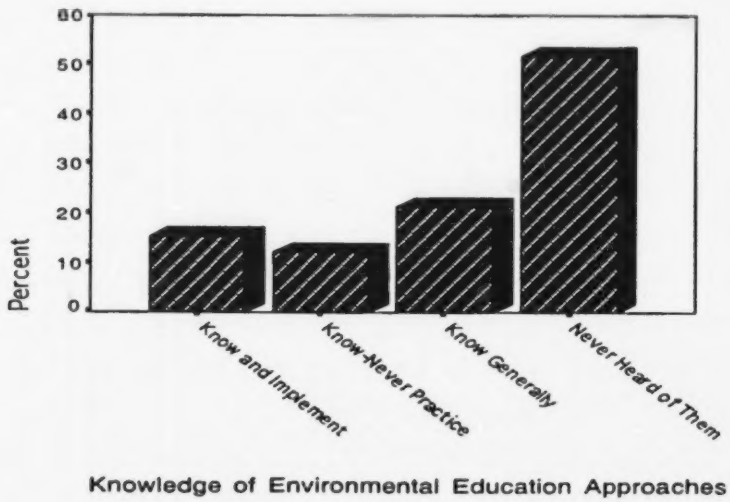


Most participants (in stage one) were not familiar with the Queensland P-12 Environmental Education Curriculum guide (Queensland Department of Education, 1993), as typified in the following comment:

> Nope. Never read the document. So we're all just stumbling along doing what we can (20).

Further, only several participants (2, 12, 16) in stage one were familiar with the terminology of 'education *about* the environment, education *in* the environment and education *for* the environment'. As figure 1.2 demonstrates, *fifty-one percent* of the pilot survey sample had never heard of the approaches education *about* the environment, education *in* the environment and education *for* the environment. *Twenty-one percent* of the sample had heard of these approaches, but had never actually practiced them.

Figure 1.2: Knowledge of Environmental Education Approaches



One participant (2), who is a committed teacher of environmental education and who has undertaken on-going in-service training in environmental education, sees 'lack of knowledge' on the part of primary school teachers as a significant barrier impeding the implementation of environmental education:

> First and foremost there is not enough knowledge... Understanding of concepts such as sustainability. They wouldn't have the background we would like them to have... I don't see the issues being addressed (2).

However, in the pilot survey only *eleven percent* of the sample considered that 'lack of knowledge' was a significant barrier to environmental education.

when asked about personal background the above-mentioned participant (2) indicated a former occupation as a wildlife carer. The participant also noted that environmental education requires 'a personal interest', and noted:

> My parents had a concern for wildlife and I have been brought up in an environment where we cared for it (2).

Most participants (in stage one) displayed some level of interest, although clearly admitted that it is not a priority in schooling generally, as indicated in the following comments:

> I don't think it is a priority anymore because there is so much else you are dealing with. You have kids that have emotional and social problems. Kids that have shocking upbringings... I know from my point of view, just covering literacy and numeracy every single day is a struggle (11).

> I wouldn't say I treat it as a priority. It is just one of those things that if it can be done, it might be (22).

> It is not my priority. I am more inclined to make sure the children have the basics under their belt (20).

The pilot survey results confirmed such findings, with the majority of teachers stating that they *"occasionally"* make it a priority in their teaching. According to the majority of the stage one participants, reasons as to why environmental education is not a *"definite"* priority in schooling is because, as one informant explains:

> It is not pushed as a priority. Literacy and numeracy are pushes... But teachers will also go down the road that principals' push and very few are focused on the environment because they

> are just as overworked. If a principal has a passion the whole school follows it. So it is not just the teachers (12).

However, the participants (in stage one) also proclaimed that 'personal choice' dictates what is taught, as one participant clearly states:

> I can do that [environmental education] if I wanted to. That's if I wanted to personally. No-one is making me do anything. They leave it very open for us to interpret so it depends on how keen I am to teach it (1).

> I don't see too much of anything being pushed at me to teach. I see things put in front of me and say this is what you have to teach but really you go away and you teach what you teach. There's still not a lot of checks and balances (20).

In this regard, the participants expressed varying levels of practice with some teachers saying "no I don't teach it" (1, 18, 13, 20), others saying "no I haven't this year at all" (11, 7, 17), with many saying "I build it [environmental education] into other units… it's incidental" (3, 4, 5, 6, 8, 10, 12, 14, 15, 16, 19) and only one staying "a lot" (2).

The pilot survey results further confirmed such findings with the majority of teachers in this sample indicating that they teach environmental education incidentally *(69.4%)*, integrated throughout the curriculum *(65.3%)*, and included with Studies of Society and Environment *(68.15%)* and Science *(62.5%)*. Once again, only one teacher indicated in the pilot survey that environmental education is taught as a 'focus' in their curriculum.

However, most teachers (in stage one) indicated that they had witnessed effective environmental education during their professional experience by some individual teachers, as typified in the following comment:

> Those few who are interested in it keep doing it, and the rest of us just go with the flow. Until something happens that impacts us directly, we just keep going the way we are (4).

Robottom et al. (2000, pg.157) have also raised this issue and concluded that "behind every successful environmental education program is a committed teacher". Such findings indicate that individual commitment to environmental education, while not apparent among the majority of this group of primary school teachers, is a vital component with respect to the implementation of environmental education.

Notwithstanding, many teachers (in stage one) indicated that they had not received any training in environmental education, as outlined by one participant:

> The opportunities are not there. When you do professional development, that's not what we are in-servicing on. We're in-servicing on other sorts of things (11).

As demonstrated in Figure 1.3 *eight-two percent* of the pilot survey sample indicated that they had never done in-servicing in environmental education, and, as indicated in Figure 1.4, *eighty-eight percent* of the sample also indicated that they had never undertaken pre-service training in environmental education.

Figure 1.3: In-Service Training in Environmental Education

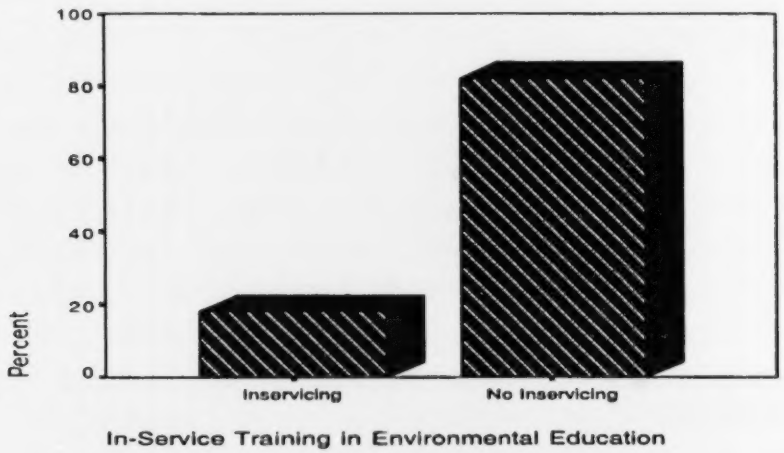
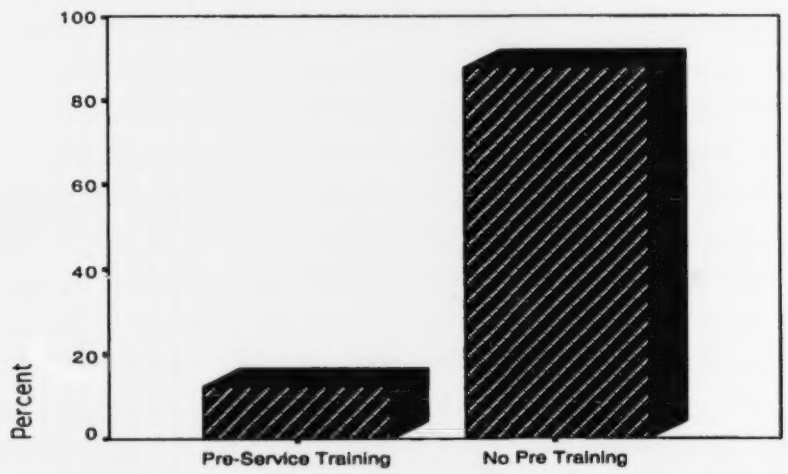


Figure 1.4: Pre-Service Training in Environmental Education



Most teachers (in stage one) indicated that they would undertake in-servicing in environmental education if it were available, although one participant, who was identified earlier as a committed environmental educator, saw it differently:

> I think it is more personal. We give them every opportunity at our place [school]. If they want to go to a workshop, everything is paid for. No commitment to follow up or report. It couldn't be easier. Like the upcoming workshop organised, there is only one person who has expressed an interest (2).

With this in mind, the participants (in stage one) did not consider 'in-servicing' in environmental education to be the major problem which was surprising considering the apparent low levels of understanding. The pilot survey revealed that the majority of teachers perceived *time constraints (34.5%), over-crowded curriculum (30.9%), constant change (14.5%)* and *lack of knowledge of environmental education (10.9%)* as the major barriers preventing or limiting the implementation of environmental education. The stage one teachers also identified such concerns, although these teachers were particularly concerned with the issues of 'constant change' and 'on-going professional demands' as one participant explains:

> Teachers are not reading and discovering and discussing professionally. There are too many changes and demands. I can't think of a week where something hasn't impinged dramatically on me trying to teach. We lose days and days. Our knowledge and skill base is dropping, but it is not necessarily our fault (12).

These pressures and their effect in Queensland were also reported by Andrews (1997). To this extent, many teachers (in stage one) indicated that "there is no motivation and no reward" to implement environmental education. Indeed, environmental education appears to be caught in a larger set of historical circumstances exemplified by the comment that there is a lack of "self-motivation" and "professionalism" in teaching itself. This same participant explained that the only way in which environmental education could be improved is through teacher education and recognised professional status:

> Nobody should get out of teacher training unless they are bloody good. No flick and tick stuff. It is whether they can teach. In environmental education, we need a foundation to start building on. A mentor in the school. There needs to be some level of professionalism (12).

While I am sympathetic with this view, it collapses teachers' content knowledge into teachers' pedagogical knowledge in a way that prioritises teaching processes over what is taught. As such, it is clear that the majority of the participants (in stage one and in stage two) have low levels of understanding in environmental education according to the criteria illustrated in Table 1.1. At the same time, these primary school teachers generally expressed concern for the environment and varying

levels of interest in the environment. So that these issues can be properly understood, I now present data about teachers' knowledge in relation to the environment, environmental concepts and content knowledge per se.

Teachers' knowledge (and beliefs) about the environment, environmental concepts and Content Knowledge

Many of the participants (in stage one) revealed a concern for the environment, although it was clearly stated that such concerns do not amount to a belief that there is a 'crisis' (at this time), as one participant indicates:

> I don't know about a crisis. I try to be optimistic. But I am personally fearful what we have done to the environment. But I don't know about crisis, as there is a lot of awareness out there (4).

On the other hand, some participants were quite pessimistic and openly said that they "did not maintain much hope for a better future", such that one participant said:

> … it's all about the big bucks, they don't care about the environment. Everyone is saying their hands are tied. Well, if everyone's hands are tied, Australia is going to be destroyed and so is the world. If everybody is of that attitude and doing their own thing, well the place is going to fall apart (1).

Furthermore, the pilot survey data revealed that *fifty-eight percent* of the sample indicated that *"if we do not make changes, environmental problems will reach crisis point in the future"*. The majority of the stage one participants, and *sixty-one percent* of the pilot survey sample indicated that they agreed most with the statement 'the environment should be protected, even if it results in a reduction in economic growth'. Interestingly, it was noted in the pilot survey data that *sixty-six percent* of *females* agreed most with the latter statement, whereas only *fifty percent* of *male* participants agreed most with the latter statement. Furthermore, *twenty percent* of the *male* participants (in stage two) agreed most with the statement that 'the environment is a resource to be used by human beings'. Thus, it was apparent that female participants displayed more sensitivity toward the environment than male participants in this sample of teachers.

Notwithstanding, the majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis as typified in the following two comments:

> I don't have enough in depth knowledge. I don't know enough to give an opinion (16).

> I wouldn't have a clue to be totally honest. I wouldn't know how bad it is. I don't know how serious the logging situation has become. I don't know about the destruction of the Amazon

rainforest. I know it happens and I know where it is, but I don't know the impact it's having (11).

To gauge their awareness in more depth, the participants (in stage one) were asked if any particular environmental issue/s concerned them. In response, all participants identified at least one environmental issue. The majority of these participants identified issues such as the greenhouse effect, ozone layer depletion, pollution and biodiversity as issues that concerned them.

The author sought to understand the participants' perception of such environmental concepts. Most of the participants openly admitted that they could not explain the various concepts in any detail. Some teachers attempted to define a concept and in doing so often revealed a low level of understanding, as typified in the following comment about the greenhouse effect:

> The greenhouse effect is to do with the ozone layer around the earth and gases emitted by various industries and cars. It rises into the ozone layer and concentrates over the poles. I read up on the greenhouse effect when I taught it and it was slightly different to this, but it has made holes over the artic and Antarctic and the suns rays penetrate through the holes in the ozone and the heat comes under the ozone layer and is not able to escape because of the gases (15).

Clearly this particular participant confused elements of ozone depletion with the greenhouse effect. In fact, I queried the participant about possible confusion with the two terms:

> I probably do [confuse them] and in the past I may have mixed them up but as I go on I am learning. The information is always changing (15).

Two participants (2, 16) revealed a better understanding of the greenhouse effect, as typified in the following comment:

> The greenhouse effect is where a number of gases are given off from industry, and the environment itself. And [the gases] are caught in the earth's atmosphere and they can't escape and this causes a build-up of heat in the atmosphere (16).

Once again, as mentioned earlier, *seventy-five percent* of the pilot survey sample rated their knowledge about environmental education (including environmental concepts) as *average to low*.[8]

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[8] In the actual mail survey, participants are requested to define several environmental concepts. This was the only item not included in the pilot questionnaire as such questions were estimated to add five to ten minutes to the completion of the questionnaire. So as to maximise the response rate of the pilot questionnaire this item was excluded.

The author sought to determine the various teachers' views about content knowledge and its significance in environmental education. The majority of teachers felt that content knowledge was not overly important, as displayed in the following comments:

> I don't think the content knowledge is vital. It would be really difficult to fill their heads with all this information and figures. You need hands on stuff rather than filling their heads with all the information (11).

> No, I don't think so. But again it's attitude. Whereas some teachers will only teach about the things that they know about. The priority is learning and that includes me... I want to learn with the kids, so I don't need to know in advance... I don't plan to have any sort of environmental issues and knowledge and content pushed with young children (26).

> Content is not important... I don't think it is a be all and end all (8).

> Not a huge content, I think they need to make sure they are not misinformed. I can walk my children along the beach and pick up things and use descriptive words to describe the shapes of things, without having to tell them... I am not into names of shells or trees and names of habitats, but I would rather say, this is interesting and I wonder why the shell is this shape? (5)

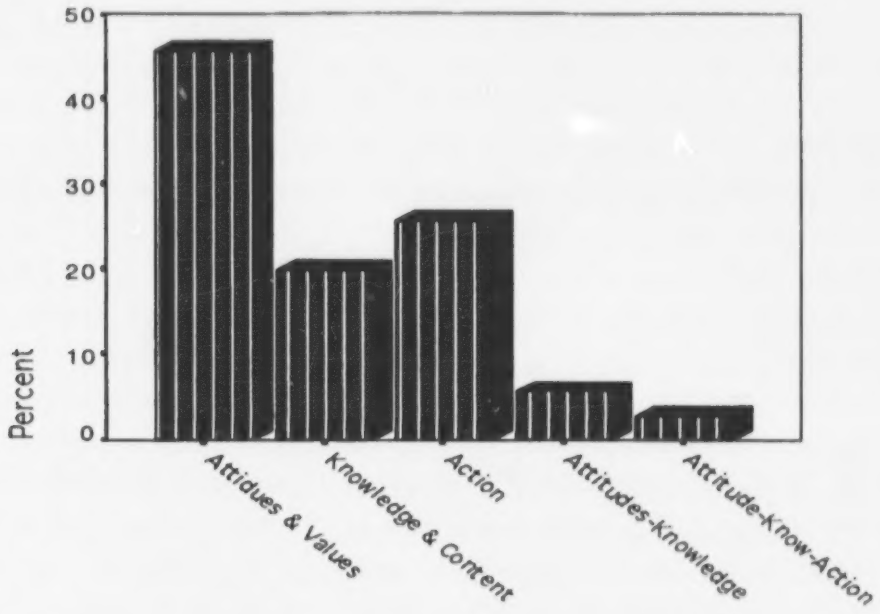
There is an implicit assumption here that 'knowledge' means transmission, the 'empty-vessel' notion of 'teaching'. This is perhaps a reflection of the teacher education theories learned by these participants during pre-service teacher education (Wilson, 1998). Accordingly, it is not surprising that many participants (in stage one) indicated that "knowledge would come much later and was not needed at the primary school level". Many participants (in stage one) indicated that knowledge is more about "knowing how to access information" (16).

Furthermore, the majority of participants revealed that "a positive attitude" towards the environment is *"definitely"* the most important characteristic to develop, as one informant explains:

> Definitely attitude. If the world is going to be made better it will be made better by good people not clever; the attitude that the world is important (18).

Such a view suggests that these primary school teachers were primarily concerned with feelings and attitudes. As indicated in Figure 1.5, the pilot survey data also confirmed such findings and revealed that *forty-eight percent* of the sample felt that attitudes and values should be the focus of environmental education at the primary school level.

Figure 1.5: Essential Aim / Focus of Environmental Education in Primary School

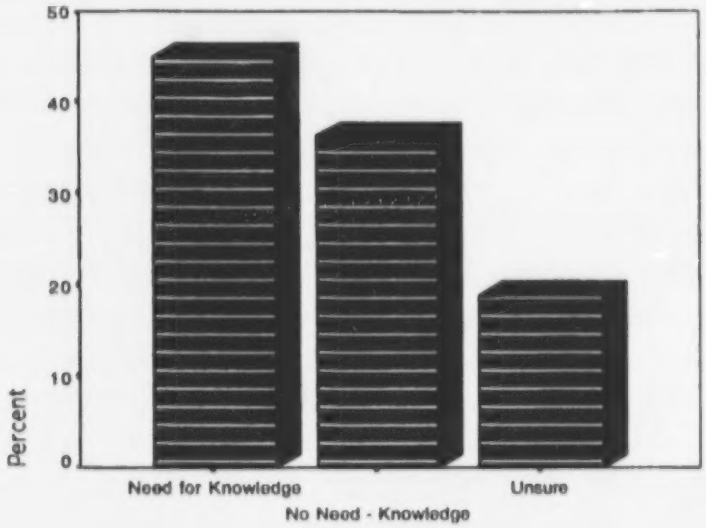


The stage one informants also felt that teachers did not need to have a significant content knowledge base, as one informant describes:

> I don't think as a teacher you need a huge content base, as such. Possibly a little bit more than what our teachers are graduating with. There are opportunities for teachers to catch up on that content-base knowledge as time goes on.

The pilot survey sample were also asked if the development of content knowledge should be essential in primary school. Only *twenty percent* of the sample felt that content knowledge (for students) is essential to develop at the primary school level. Further, stage two participants were asked *"do you feel that teachers need advanced knowledge of environmental education concepts, theories and teaching approaches"?* As illustrated in Figure 1.6, *forty-five percent* of teachers felt that such knowledge was needed and *thirty-six percent* of teachers felt that such knowledge was not needed. A further *nineteen percent* stated that they were unsure, indecisive. Thus, the latter findings indicate that there is a clear divide between this sample of teachers as to the apparent 'value' of knowledge in primary school education.

Figure 1.6: Teachers' Need for Knowledge in Environmental Education



Such data are consistent with the findings of 'The Queensland School Reform Longitudinal Study' stating that "after commitment to basic skills development, teachers valued social interaction goals as the second most highly rated set of goals" (Education Queensland, 2001, pg.10). Once again, this apparent abandonment of knowledge (Cutter, 2002) among a significant proportion of these participants is also consistent with the findings of 'The Queensland School Reform Longitudinal Study' which maintains that "teachers themselves actually rate basic skills as the highest of their priorities, and intellectual engagement and demand as the lowest"(Education Queensland, 2001, pg.15).

I now discuss and synthesise such data in the context of the literature review and theoretical framework presented earlier.

Data Synthesis

Based upon the data presented, I contend that current primary school teachers are likely to be functioning at a level of environmental illiteracy and/or nominal environmental literacy according to Table 1.1. This is evident through six key findings:

One, the stage one participants, as a group, displayed little or simple understandings of environmental education. In fact, the majority of the participants openly expressed their lack of knowledge about environmental education. Further, the majority of participants in stage one were not familiar with (nor implemented) the environmental education approaches 'education *about* the environment, education *in* the environment and education *for* the environment'. They were neither aware of environmental education curriculum nor policy documents. These trends were also confirmed in the stage two pilot

survey data. Such findings confirm that environmental education as a curriculum area, including education *for* the environment, is failing in Queensland primary schools.

Two, most stage one participants displayed some level of interest for environmental education, although such informants clearly admitted that it is not a priority in schooling. Once again, the pilot survey results confirmed such findings, with the majority of teachers stating that they *"occasionally"* make it a priority in their teaching. Thus, similar to the apparent declination of concerns for the environment in society generally, it appears that interest has declined in environmental education also when compared to previous stated interest levels (see Spork, 1990; 1992).

Three, the pilot survey revealed that the majority of teachers perceived *time constraints, over-crowded curriculum, constant change* and *lack of knowledge of environmental education* as the major barriers preventing or limiting the implementation of environmental education. The stage one teachers also identified such concerns, although these teachers were particularly concerned with the issues of 'constant change' and 'on-going professional demands'. Such issues of constant change, on-going professional demands and lack of knowledge of environmental education have not been specifically researched in the field of environmental education, although existing research (Andrews, 1997) identified these pressures in Queensland schools.

Four, both stage one and stage two participants indicated that had received no or very little in-service and / or pre-service training in environmental education. Spork (1990; 1992) also reported in her study that primary school teachers receive little professional preparation to teach environmental education. Spork (1990; 1992) indicated that 4.9% of her sample received pre-service training, however accordingly to the findings of my study this figure has risen to 12%. Spork (1990; 1992) further reported that 6.6% of this same sample only received in-service training. Once again, it can be seen that this particular figure has risen to 18%. Thus, it appears that teachers are receiving more professional preparation in environmental education, however the benefits of such training are yet to be discovered.

Five, many of the participants (in stage one) revealed a concern for the environment, although it was clearly stated that such concerns do not constitute a 'crisis' (at this time). Notwithstanding, the majority of the participants (in stage one) said that they did not know much about the idea of an environmental crisis.

Six, the (stage one) participants held many misconceptions and simple understandings of various environmental concepts. Most of the participants openly admitted that they could not explain the various concepts in any detail. Furthermore, the majority of teachers felt that content knowledge was not overly important and that "a positive attitude" towards the environment is *"definitely"* the most important characteristic to develop. Once again, such trends were confirmed in the stage two data. Moreover, both stage one and stage two participants indicated that primary school teachers do not

require substantive content knowledge. Such teachers were more of the view that it is more important to know how to access information.

This final point indicates that the participants in this study neither obtained sufficient content knowledge of environmental education nor were concerned about that fact. Indeed, it is clear among these participants that neither content knowledge, nor knowledge generally, is considered to be of any real value. Such findings can be placed in wider theoretical arguments, as discussed earlier, to do with knowledge and its apparent lack of focus in education over the past thirty years (Wilson, 1998). Wilson (1998) states that "filling up people's minds with a lot of stuff" is considered to be a 'bad' model of education. He further states that content knowledge is "what fills the bucket wielded by teachers". Based upon the findings of this study, *'the bucket is empty'* for many teachers in the case of environmental education.

Concluding Comments

It is apparent that the majority of the participants, in stage one and stage two, maintain low levels of environmental literacy in accordance with Table 1.1. Such findings are important because if these levels of environmental literacy are widespread, it is unlikely that the current Queensland education system will produce an environmentally literate citizenry. This conclusion will be tested in the final phase of stage two (the state-wide mail survey).

I conclude that the introduction of environmental literacy in educational policy may advance the goals of environmental education, although such initiatives are unlikely to significantly change the current status of environmental education unless there is a system-wide commitment to environmental education and knowledge production and dissemination on the part of governments, education departments, pre-service teacher education providers, schools and teachers themselves.

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